EXHIBIT A

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

IN RE: BRANDI PRICE and CHRISTINE CHADWICK, on behalf of themselves and all others similarly situated, Plaintiffs, v. L'OREAL USA, INC. and MATRIX ESSENTIALS LLC, Defendants.	Master Case No: 1:17-cv-614 (LGS)

EXPERT REPORT OF PROFESSOR JEAN-PIERRE H. DUBÉ

CONFIDENTIAL UNDER SECOND AMENDED PROTECTIVE ORDER GOVERNING CONFIDENTIAL INFORMATION

I. INTRODUCTION AND PURPOSE

1. I have been engaged as an expert by Plaintiffs' counsel in this case. I provide this report in connection with the case filed by Plaintiffs against Defendants, L'Oréal USA, Inc. and Matrix Essentials, LLC (collectively, "Defendants"). I have been advised by counsel for Plaintiffs that individuals purchased Defendants' Matrix Biolage Keratindose Pro-Keratin+Silk Shampoo, Pro-Keratin+Silk Conditioner, and/or Pro-Keratin Renewal Spray (together, "the Challenged Products") which were labeled as "Keratindose" and "Pro-Keratin+Silk." In addition, the shampoo was labeled as "Shampoo for Overprocessed Hair," the conditioner as "Conditioner for Overprocessed Hair," and the spray as "Pro-Keratin Renewal Spray." I have been further advised that Plaintiffs allege that these claims are false, misleading, and/or deceptive to a reasonable consumer and therefore should not have been made.

2. I have been asked by counsel for Plaintiffs to provide an expert opinion on whether a method exists to determine damages in this case on a classwide basis using common evidence for the following misrepresentations (hereafter "Challenged Claims"):

i. Defendants' claims on the shampoo labels of "Keratindose," "Pro-Keratin+Silk" and "Shampoo for Overprocessed Hair;"[1]

ii. Defendants' claims on the conditioner labels of "Keratindose," "Pro-Keratin+Silk" and "Conditioner for Overprocessed Hair;"[2]

iii. Defendants' claims on the spray labels of "Keratindose," "Pro-Keratin+Silk" and "Pro-Keratin Renewal Spray."[3]

3. It is my opinion that it is possible to determine classwide damages in this case using Conjoint Analysis. I am providing an expert opinion regarding the following matters:

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[1] See The Amended Class Action Complaint (hereafter "the Complaint"), paragraph 27.
[2] See the Complaint, paragraph 27.
[3] See the Complaint, paragraph 27.

i. The existence of a methodology that can measure and quantify the impact of the Challenged Claims on the packaging of the Challenged Products.

ii. A description of the methodology and its implementation, given the existence of such methodology and suitable data, and the feasibility of measuring (a) the incremental consumer willingness-to-pay for the Challenged Products due to the Challenged Claims; and (b) the price premium charged for the Challenged Products due to the Challenged Claims.

4. My opinions in this report are based on my own experience and training as well as the materials that I have reviewed, as summarized in Appendix B. The Plaintiffs are compensating me for my time at my standard hourly rate of $850, plus direct costs. My compensation is not dependent on the opinions I express or on the outcome of the case.

II. QUALIFICATIONS[4]

5. I am the Sigmund E. Edelstone Professor of Marketing at the University of Chicago Booth School of Business. I am also an appointed Faculty Research Fellow at the National Bureau of Economic Research and an Academic Trustee for the Marketing Science Institute. I received my B.Sc. in quantitative methods in economics with a minor in French literature from the University of Toronto in 1995. In 2000, I completed my Ph.D. in Economics at Northwestern University.

6. I have been on faculty at the University of Chicago Booth School of Business since 2000. During this time, I have served as the area advisor for Ph.D. students in marketing and as the coordinator of the MBA courses in marketing. I am also the director of the Booth School's Kilts Center for Marketing which, amongst other functions, serves as the official distributor of Nielsen's Consumer Packaged Goods (hereafter CPG) databases for academic usage worldwide. These databases include household purchases and store-level sales and marketing data for packaged health and beauty products like the Challenged Products.

[4] See Exhibit 1 for my curriculum vitae, published works, and speeches and Exhibit 2 for my testimony experience.

7. During the course of my seventeen-year career, I have taught MBA and executive courses at the University of Chicago on Digital Marketing Strategies, Pricing Strategies, Category Management for Retailers, and Marketing Analytics & Big Data. I also teach a Ph.D.-level course in Advanced Quantitative Marketing. Several of these courses cover frameworks for modeling and empirically estimating consumer willingness-to-pay and consumer demand. In addition, several of these courses cover Conjoint Analysis and its use for demand estimation.

8. I have published thirty-six articles, mostly in the leading Marketing and Economics journals. Several of these papers have been nominated for and/or won awards for best paper. I also currently serve as an Area/Associate Editor for the four leading Quantitative Marketing journals: *Management Science, Marketing Science, Journal of Marketing Research,* and *Quantitative Marketing and Economics.*

9. My research typically uses state-of-the-art theory and methods from the domains of economics, quantitative marketing, econometrics and statistics. Several of my papers analyze consumer choice data from the CPG industry in the US to measure and quantify consumer preferences and consumer decision-making. A recurrent theme in this work is the role of product differentiation and brands on consumer demand for CPG brands. Many of these papers have studied the normative implications for CPG firms' pricing and advertising strategies. A standard approach for deriving such normative implications consists of using models estimated with consumer data to conduct but-for analyses.

10. My research focuses broadly on topics related to consumer demand for branded goods, on the demand side, and firm's pricing, advertising and branding decisions, on the supply side. Several of my published papers analyze consumer choice data from the CPG industry to estimate consumer preferences and to analyze consumer purchase decisions. A recurrent theme in this work is the role of consumer preferences for tangible product features (e.g., package size) and intangible features (e.g., brand) on consumer willingness-to-pay and demand for CPG products.

11. A recent stream in my research studies the role of consumer expertise and the role of information on consumer purchase decisions. The findings from my published paper about expert buyers and demand for private label products versus national brands were covered in the popular press, including the Wall Street Journal, Slate Magazine and NPR radio.[5] In a related stream, I have studied the role of consumer expectations on demand, including a project that proposed and implemented a novel conjoint survey design.

12. I have worked as an expert witness on several cases related to allegedly misleading packaging claims, cases related to branding and trademark/copyright matters, and cases related to the impact of packaging imagery and packaging information on pricing and other market outcomes. Several of these cases have involved the use of Conjoint Analysis. In three cases, I testified as an expert witness in a deposition.

13. I have also frequently consulted with firms in a variety of industries that include consumer goods, professional services, digital media, high technology, software and healthcare. In several of these engagements, I have used Conjoint Analysis to estimate consumer preferences for the purposes of measuring willingness-to-pay and demand.

14. Additional qualifications are listed in my Curriculum Vitae attached as Exhibit 1. My testimony history is attached as Exhibit 2. Attached as Exhibit 3 is a summary of documents and information I have relied upon in forming my opinions in this report.

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[5] Do Pharmacists Buy Bayer? Sophisticated Shoppers and the Brand Premium (with Bart Bronnenberg, Matthew Gentzkow and Jesse Shapiro), Quarterly Journal of Economics, 130(4), 2015.

III. CONJOINT METHODOLOGY FOR QUANTIFYING THE IMPACT OF THE CHALLENGED CLAIMS ON THE PACKAGING OF THE CHALLENGED PRODUCTS

A. Target Population and Sample Design

15. The target population consists of the entire set of individuals about which the analyst intends to draw inferences based on the sample of survey respondents[6], i.e., the population to which the sample results (in this case estimates of consumer preferences) are meant to generalize. In this case, the Defendants' target population for its "in-salon brands" [7] consists of individuals in the United States "who have gone to a salon and had extensive chemical treatments and therefore have overprocessed hair."[8] While the "primary target is women," the consumers in the target population "are both male and female."[9] The consumer class is then a subset of this target population: individuals in the target population who purchased the Challenged Products during the class period.

16. Consumer respondents are sampled from a respondent panel maintained for marketing purposes by a third party company.[10] The defined target population can be reached by conducting a double-blind internet survey asking a series of questions to collect the survey data.[11] In this case, sample members would be qualified to participate in the research study if they are at least 18 years old and indicate that:

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[6] Target Population, Encyclopedia of Survey Research Methods, Paul J. Lavrakas, editor; Sage Publications, Inc. 2008, pp. 875-876 at 875).
[7] See the Deposition of Defendants' corporate representative, by Melissa Morris Bacallao, (hereafter "Bacallao Deposition"), page 52.
[8] See the Bacallao Deposition, page 49.
[9] See the Declaration of Melissa Morris Bacallao (hereafter "Bacallao Declaration"), paragraph 4.
[10] For instance, Survey Sampling International ("SSI") maintains a large panel of at least 4.5 million respondents that are recruited using state-of-the-industry recruitment and retention methods. Because of SSI's panel recruitment and retention procedures, its panel can be used to create a balanced and representative sample of the U.S. population across numerous demographic and socio-economic variables. Similarly, Research Now maintains a panel of over 6 million respondents worldwide.
[11] A double-blind survey is one where neither the respondents nor the data collection organization conducting the survey were aware of the purposes of the research. A double-blind survey design prevents both parties from discerning an anticipated or preferred pattern of responses. (See Diamond, Shari Seidman. Reference Guide on Survey Research, *Reference Manual on Scientific Evidence, Third Edition.* Committee on the Development of the Third Edition of the Reference Manual on Scientific Evidence, Federal Judicial Center, National Research Council. p. 419).

- Within the last 12 months they have had an in-salon chemical hair treatment; and/or,
- Within the next 12 months they plan to have an in-salon chemical hair treatment.

In addition, qualified sample members would be classified as class members by indicating that within the last 12 months, they purchased any of the Challenged Products. Note that I used a 12-month time horizon for illustrative purposes. A different time horizon could easily be accommodated, as could a different time horizon for backward-looking versus forward-looking purchase intentions.

B. Survey Methodology

17. The proposed Conjoint Analysis consists of a choice-based conjoint survey (hereafter CBC) and analyzing the survey results. CBC proceeds by asking the consumers in the survey sample to respond to a sequence of choice tasks. In each task, the consumer is presented with a choice between a finite number of product alternatives. Each alternative is described by a set of features chosen by the analyst, including the price. Typically, a no-purchase alternative is included in the choice set. For each task, the consumers must make a single choice. Across each task, the analyst changes the set of products, the levels of the features and the prices in the choice set. Therefore, it is possible for the analyst to include branded products or products that include or exclude the Challenged Claims, consistent with the allegations in this case. This procedure allows the analyst to observe how the consumer trades-off features and prices. The data consists of the choices and the corresponding features of the product alternatives from each task.

18. The survey methodology used to construct the survey and analyze the results is commonly referred to as a Conjoint Analysis. Conjoint Analysis has been used in the field of marketing research dating back to at least the early 1970s.[12] Since that time numerous developments and refinements of

[12] See Green, Paul E. and Vithala R. Rao. Conjoint Measurement for Quantifying Judgmental Data. *Journal of Marketing Research*. Vol. 8, No. 3, August 1971, pp. 355-363. The theoretical underpinnings for conjoint methods date back to 1964 with the work of Luce and Tukey. (See Luce, R. Duncan and John W. Tukey. Simultaneous Conjoint Measurement: A New Type of Fundamental Measurement. *Journal of Mathematical Psychology*. Volume 1, Issue 1, January 1964, pp. 1-27).

Conjoint Analysis techniques have led the approach to become one of the most widely studied, accepted and applied methods for measuring and modeling consumers' preferences.[13]

19. Conjoint Analysis is based on the notion that consumers' preferences for a product or service are formed by the features that are part of that product or service. Those product or service features are coupled together, or *conjoined*, such that the features taken together lead to some measure of satisfaction or utility when that product or service is used or consumed. Conjoint Analysis allows the researcher to deconstruct the satisfaction or utility derived from the use or consumption of the product or service into its component features. In that way, a researcher can determine consumers' preferences for a product or service based on an understanding of the product's or service's conjoined features (or attributes) and develop an understanding of the relative importance and impact each of the features have on consumers' preferences for the product or service.

20. For the purposes of this case, I propose to conduct a separate Conjoint Analysis for each of the three in-salon hair product categories: shampoo, conditioner and renewal spray. I would also likely include the following product features to study consumers' preferences for the products in each of the three categories[14]: Brand name[15], purchase price, and labeling information regarding Keratin and hair repair. In-salon brands can have different levels of these features. The levels of these features would be varied in the survey to create product configurations (or profiles) of in-salon hair products. Three different product profiles would be presented at a time to survey respondents in the form of a choice task to determine which of the product profiles they would choose. In each

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[13] See, for example, Orme, Bryan K. "A Short History of Conjoint Analysis." *Getting Started with Conjoint Analysis: Strategies for Product Design and Pricing Research*. Research Publishers LLC, Madison, WI, 2010.

[14] At this time, the exact set of included features has not yet been finalized.

[15] According to the Bacallao Declaration, "L'Oréal considers the main brand competitors for the Products to be Aveda, Redken, Pureology, Paul Mitchell, Joico, Aquage, and TIGI. I would likely include each of these competing brands in the Conjoint Analysis.

choice task, respondents would also be asked whether or not they would purchase the in-salon hair product they chose at the price indicated.[16]

21. Presenting a set of product profiles and asking which product profile a consumer would purchase is known as a choice-based conjoint ("CBC"). CBC analysis is one of the most widely used conjoint techniques in the world because CBC questionnaires closely mimic the purchase process for products in competitive contexts.[17] Conceptually, the researcher uses a choice model to infer a survey respondent's preferences from her stated choices, much like the classic micro-economic approach of "revealed preference."[18]

22. The CBC analysis is preferred to alternative conjoint techniques for a number of reasons. The CBC approach is rooted in "random utility theory," which enables the researcher to analyze the survey responses through the lens of a well-tested theory of choice behavior.[19] These roots in random utility theory provide a statistical error theory for the model and the preference estimates. Hence, the researcher can measure the precision of her predictions regarding preferences and demand. The choice-based nature of the survey task also mimics more realistically the purchase behavior of a consumer in a retail store environment, in contrast with ratings-based approaches requiring the consumer to assign a numeric score to each of the alternatives in the choice set.

23. The CBC approach also does not allow survey respondents to focus unrealistically on a single product feature because there are numerous features whose levels are varied to construct

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[16] This option of indicating whether or not survey respondents would actually purchase the in-salon hair product they chose is sometimes referred to as the "outside option." Since the outside option gives survey respondents the opportunity to indicate that they would not purchase any of the product profiles given in the choice task, it reduces or eliminates potential demand effects that might result if respondents were constrained to make a "forced purchase." Moreover, it permits the estimation of demand for in-salon hair products taking into account potential demand attrition.

[17] Orme, Bryan K. "A Short History of Conjoint Analysis." *Getting Started with Conjoint Analysis: Strategies for Product Design and Pricing Research*. Research Publishers LLC, Madison, WI, 2010, p. 45.

[18] Samuelson, Paul. (1938). "A Note on the Pure Theory of Consumers' Behaviour". Economica 5, 61–71.

[19] See for instance the discussion in McFadden D. (1986), "The choice theory approach to market research," *Marketing Science*, 5, 275-279.

product profiles. In other words, CBC questionnaires reduce or eliminate demand artifacts that might otherwise exist if the questionnaire focused on only one product feature.[20]

C. CBC Model Estimation

24. To estimate consumer preferences using the stated choices from the survey, I would use the "random coefficients logit" model of consumer demand. The random coefficients logit model of demand is a standard modeling approach used to analyze choice data and to estimate consumer preferences for product features in the quantitative marketing literature.[21] The parameters of the random coefficients logit model consist of the consumer preferences for the product features varied in the survey. The model allows for each consumer to have her own idiosyncratic preferences for these features. Therefore, the method takes into account the heterogeneity across consumers in their tastes for in-salon hair products. In Appendix A, I summarize the mathematical derivation of the random coefficients logit model of demand and the statistical equations used to estimate preferences.

25. To estimate the preference parameters, I would use a Hierarchical Bayesian MCMC algorithm (HB). This statistical approach is very standard in the quantitative marketing literature using consumer choice data[22] and in the application of conjoint analysis to stated choice data,[23] like the survey data I proposed in section III.A. The HB algorithm is used to simulate the posterior distribution of the preference parameters from the random coefficients logit model. This posterior distribution is then used to make inferences about preferences and consumer demand. Appendix A provides the formulation of the HB algorithm used in my analysis.

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[20] A demand artifact is the effect on the results of a study from the way the study was constructed rather than the results being based solely on the phenomenon being studied.
[21] Chintagunta, P. K., and H. Nair (2011): "Discrete-Choice Models of Consumer Demand in Marketing," Marketing Science, 30(6), 977–996.
[22] Rossi, P. E., G. M. Allenby and R. McCulloch (2005), Bayesian Statistics and Marketing, New York: John Wiley and Sons.
[23] Bryan Orme (2000), "Hierarchical Bayes: Why all the Attention?" Sawtooth Software Research Series.

D. But-For Analysis and Damages Measures

26. The Conjoint Analysis provides estimates of parameters describing a given consumer's utility function. Standard procedures can then be used to measure the economic value (in dollars) of any product feature, including a packaging claim.

27. In determining a measure of classwide damages, the objective consists of predicting the classwide economic value in dollars that would have been obtained from in-salon hair product purchases "but for" the Challenged Claims on the packaging of the Challenged Products. Suppose that a legal conclusion is established that deems the Challenged Claims to be false, misleading and/or deceptive, requiring Defendants to remove the Challenged Claims from the packaging of the Challenged Products. Damages can then be assessed by comparing the classwide economic value obtained from the currently available set of products versus the counterfactual classwide economic value that would have been obtained with the Challenged Claims removed from the packaging of the Challenged Products.

28. One potential method for measuring classwide damages is based on the price premium the Defendants charge by using the Challenged Claims on the packaging of the Challenged Products: the difference between the price currently charged by Defendants and the price it would have charged had it been required to remove the Challenged Claims. This measure is incomplete since, in practice, consumers are not forced to purchase the Challenged Products. Several brands of in-salon hair products compete with the Challenged Products.[24] If Defendants are required to remove the Challenged Claims from the Challenged Products' packaging, some consumers may no longer be willing to pay the Challenged Products' price and may switch to a competing brand. Alternatively, some consumers may forego purchasing in-salon hair products altogether (i.e. choose "no

[24] Plaintiffs' Counsel have advised me that there are five major competitors to Defendants' products, as enumerated in Footnote 15.

purchase"). Even in the absence of any price premium, consumers would be harmed if they would not have purchased the Challenged Products but for the Challenged Claims.

29. We use a standard approach from the academic literature to measure classwide damages, often termed "willingness-to-pay" (hereafter "WTP").[25] The term WTP is sometimes used because one can interpret the damages measure as the dollar amount a consumer would need to be compensated for the loss of the value she associated with the Challenged Claims and the potential price premium.

30. Formally, WTP for the Challenged Claims on the Challenged Products' packaging is computed by comparing the classwide expected economic value in dollars from offering the consumer the following two choice sets respectively:

i) The choice set currently available (A): this choice set includes all the available products, including the Challenged Products with the Challenged Claims on the packaging and competing brands. The choice set also includes a "no purchase" option.

ii) The counterfactual choice set (B): this choice set is identical to A except that the Challenged Claims are removed from the packaging of all of Challenged Products. In the event that the removal of the Challenged Claims changes overall in-salon hair products demand, one could also allow the prices of all the products (Defendants and their competitors' prices) to potentially adjust to their new competitive levels.

WTP for the Challenged Claims consists of computing the difference in classwide economic value in dollars between scenario A and scenario B. This method accounts for both the change in demand

[25] See for instance Allenby, G. and J. Brazzell and J. Howell (2014): "Economic Valuation of Product Features," Quantitative Marketing and Economics, Vol. 12, no. 4, 421-456.

and the potential price premium. The formal methodology for computing WTP is presented in Appendix B.

31. The WTP measure is a cornerstone of normative economic analysis and can be found in any introductory, graduate-level textbook in microeconomics in the section on "welfare analysis" (e.g. chapter 10 of Varian 1992 and chapter 3.I of Mas-Collel et al. 1995). In empirical work, academics have used WTP to measure the value to consumers from new product introductions (e.g. Trajtenberg 1989, Hausman 1997, Petrin 2002, Hausman and Leonard 2002, Klier and Lin 2012, Gowrisankaran 2012), the harmful effects of price changes due to mergers (e.g. Nevo 2000), the effects of alternative retail pricing structures on consumer value (e.g. Chintagunta et al. 2003), the value of competing firms' product lines (e.g. Besanko, Gupta and Jain 1998), and the value to consumers of a product feature/characteristic (e.g. Allenby et al. 2014). All of these papers have measured value in a manner analogous to equation (10) in Appendix B.1.

32. I have not yet analyzed any data samples for the in-salon hair products category. Accordingly, I do not yet have an opinion regarding the exact manner in which prices are set by Defendants or their competitors. However, the change in consumer demand for in-salon hair products in response to the removal of the Challenged Claims from the Challenged Products' packaging would likely change Defendants and their competitors' respective pricing incentives. As indicated in paragraph 30 above and in Appendix B.1, the proposed measure of classwide damages can incorporate a price premium charged by Defendants. This component would require me to measure the change in equilibrium prices charged by each of the competing in-salon hair products brands.[26] A methodology for computing the change in equilibrium prices is presented in Appendix B.2.

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[26] See Allenby, Brazell, Howell, and Rossi (2014) for a discussion of the importance of computing the change in equilibrium prices in damages calculations.

IV. RESERVATION OF RIGHTS

33. I understand that discovery in this case is ongoing and that merits discovery to date has been limited by the Court. I have not been asked at this juncture to conduct a Conjoint Analysis. Therefore, I have yet to determine the incidence or magnitude of damages at this point; although I am confident that I will be able to do so. The data necessary to conduct my analysis and damage calculations are available from several sources: Defendants' own business records, industry resources and independent market researchers (e.g., IRI), and surveys administered on behalf of Plaintiffs. I may amend or supplement my opinions to take into account facts developed in the discovery process.

Respectfully submitted:

Jean-Pierre H. Dubé, Ph.D.
Sigmund E. Edelstone Professor of Marketing
The University of Chicago Booth School of Business
November 4, 2017

Appendix A

A.1 The Conditional Logit Model of Demand

First define the following notation. Let $h=1,\ldots,H$ index the consumers in the data sample. Let $j=1,\ldots,J$ index the Challenged Products available in a market. Let X_j denote the $(K \times 1)$ vector of features of product alternative j. Let p_j denote the price of product j.

Assume that each consumer can only choose one single alternative. Consumer h obtains the following utility when she chooses product j:

$$u_j^h = X_j'\beta^h - \alpha^h p_j + \epsilon_j^h \quad (1)$$

where ϵ_j^h is the component of consumer h's utility that is not observed to the analyst. β^h is a $(K \times 1)$ vector of marginal utilities for each of the respective features. α^h is a consumer's price sensitivity, capturing the opportunity cost of her money given that she could have decided not to buy a product and use the money for other purposes. We can collectively refer to a consumer's *tastes* as: $\theta^h = (\beta^h, \alpha^h)$. Let $j=0$ denote the no-purchase choice and let $u_0^h = \epsilon_0^h$ denote the utility from not purchasing anything.

Following the convention in the literature on discrete choice demand estimation[27], we assume that ϵ_j^h is independently and identically distributed Type I Extreme Value across households and product alternatives. If a consumer always chooses the alternative that gives her the highest utility, then it is straightforward to show that the probability that she chooses product j is:

$$Prob(j|X;\theta^h) = \frac{exp(X_j'\beta^h - \alpha^h p_j)}{1+\sum_{i=1}^{J} exp(X_i'\beta^h - \alpha^h p_i)}. \quad (2)$$

Equation (2) is the standard conditional logit choice probability.

In practice, the analyst does not know each consumer's *tastes*, $\{\theta^h\}_{h=1}^H$. If we assume that the population distribution of marginal utilities is Normal, then $\theta^h \sim N(\bar{\theta}, \Sigma)$ where $\bar{\theta}$ and Σ are the mean and covariance matrix respectively. The unconditional probability that consumer h chooses product j is then:

$$Prob(j|X;\bar{\theta},\Sigma) = \int \frac{exp(X_j'\beta - \alpha^h p_j)}{1+\sum_{i=1}^{J} exp(X_i'\beta - \alpha^h p_i)} d\Phi(\bar{\theta},\Sigma) \quad (3)$$

where $\Phi(\bar{\theta},\Sigma)$ is the cumulative density function of a Normal distribution with mean $\bar{\theta}$ and covariance matrix Σ. Equation (3) is the standard random coefficients logit choice probability. If we aggregate (3) across all consumers, $h=1,\ldots H$, we obtain the random coefficients logit model of demand.

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[27] McFadden, D. L. (1981): "Econometric Models of Probabilistic Choice," in Structural Analysis of Discrete Choice, ed. by M. Intrilligator, and Z. Griliches, pp. 1395–1457. North-Holland.

A.2 Estimation of the Random Coefficients Logit using MCMC

Suppose each of the *h=1,…,H* consumers in the data sample make *t=1,…,T* independent choices. For each choice task, the analyst observes the features, X_{jt}, of each of the $j = 1, \ldots, J_t$ product alternatives. The analyst also observes which product a consumer chose in each task:

$$y_{jt} = \begin{cases} 1, j\ chosen\ on\ task\ t \\ 0, else \end{cases} \quad (4)$$

For a given consumer *h*, the conditional likelihood of observing her sequence of choices is given by:

$$\mathfrak{L}(Y_h|X_h;\theta^h) = \prod_t \prod_j Prob(j|X_t;\theta^h) \quad (5)$$

where the probabilities are given by equation (2).

An MCMC estimate would be obtained by simulating a Markov Chain from the following Hierarchical model:

$$\mathfrak{L}(Y_h|X_h;\theta^h) \quad (6i)$$
$$\theta^h \sim N(\bar{\theta}, \Sigma) \quad (6ii)$$
$$\bar{\theta} \sim N\left(\bar{\bar{\theta}}, \mathrm{A}^{-1}\right) \quad (6iii)$$
$$\Sigma \sim IW(\nu, V) \quad (6iv)$$

where $\bar{\bar{\theta}}, A, \nu\ and\ V$ are prior parameters that need to be set by the researcher, $N\left(\bar{\bar{\theta}}, \mathrm{A}^{-1}\right)$ is the cumulative distribution function of a multivariate normal random vector with mean $\bar{\bar{\theta}}$ and covariance matrix A^{-1}, and $IW(\nu, V)$ is an inverted Wishart distribution with location and scale parameters ν and V, respectively. We use a combination of a Gibbs Sampler and a Random-Walk Metropolis Algorithm to generate the Markov Chain.[28]

[28] Details on how to draw a Markov chain with which to estimate the model parameters are available in: Rossi, P. E., G. M. Allenby and R. McCulloch (2005), Bayesian Statistics and Marketing, New York: John Wiley and Sons.

Appendix B

B.1 WTP and Classwide Damages

Let the $(J \times K)$ matrix X^A denote the product features of all the currently available products, including Defendants and their competitors. The J rows of X^A correspond to each of the available products and the K columns correspond to each of the product features. This matrix could include a row of zeros corresponding to the "no-purchase" option. Let the vector p^A denote the prices of each of the available products. The combination of currently available prices and product features, (X^A, p^A), represents scenario A in paragraph 30 i). The analyst can compute the expected dollar value derived by a consumer h when confronted with this purchase scenario A as follows:

$$Value(\boldsymbol{X^A}, p^A; \theta^h) = \int \frac{ln\left(1+\sum_j exp\left(x_j^A \beta^h - \alpha^h p_j^A\right)\right)}{\alpha^h} dF(\theta^h, D) \quad (7)$$

where $F(\theta^h, D)$ denotes the posterior distribution of θ^h from the HB procedure, and D denotes the conjoint survey data.

Suppose that a legal conclusion is established that deems the Challenged Claims to be false, misleading and/or deceptive, requiring Defendants to remove the Challenged Claims from the packaging of the Challenged Products. Let X^B denote the product features. X^B and X^A are identical except for the rows corresponding to Defendants' Products, which no longer exhibit the Challenged Claims on the packaging. Let the prices in this scenario be denoted by the vector p^B. These prices can potentially different from p^A if the analyst concludes that Defendants and their competitors would have charged different prices had the Challenged Claims not been present on Defendants' packaging. The combination of counterfactual prices and product features, (X^B, p^B), represents scenario B in paragraph 30 ii). The analyst can compute the expected dollar value derived by a consumer h when confronted with this purchase scenario B as follows:

$$Value(\boldsymbol{X^B}, p^B; \theta^h) = \int \frac{ln\left(1+\sum_j exp\left(x_j^B \beta^h - \alpha^h p_j^B\right)\right)}{\alpha^h} dF(\theta^h, D). \quad (8)$$

Maintaining the same assumed legal conclusion as above, the analyst can compute the damages for a consumer h when she makes purchases under scenario A (which includes Challenged Claims on the packaging of Defendants' Products) instead of under scenario B (which removes the Challenged Claims) as follows:

$$WTP^h = Value(\boldsymbol{X^A}, p^A; \theta^h) - Value(\boldsymbol{X^B}, p^B; \theta^h). \quad (9)$$

WTP^h can be interpreted as the dollar compensation that one would need to pay to consumer h to make her as well off under scenario A as she would have been under scenario B. This differential reflects several key factors. First, WTP^h reflects any potential price premium that could have been charged by Defendants due to their use of Challenged Claims on the packaging of their Products. This premium is reflected by comparing the appropriate rows of p^A and p^B. Second, WTP^h takes into account the fact that a consumer's likelihood of purchasing the challenged Defendants' Products could change once the Challenged Claims are removed from the packaging and,

potentially, the in-salon hair products prices adjust in response. Thus, the measure accounts for switching to another brand or even choosing not to purchase but for the Challenged Claims.

Our analysis thus far is based on a sample of *H* consumers from the class. Suppose that the total population of the class consists of M consumers (where *M* is much larger than *H*). The proposed measure of classwide damages is based on aggregating the consumer-level damages from equation (9) as follows:

$$WTP = M\frac{\Sigma_h WTP^h}{H}. \tag{10}$$

B.2 Equilibrium Prices

Suppose that the available product features and prices are X and p, as before. Then, the share of consumers who would choose to buy brand j is given by:

$$s(j|X;\bar{\theta},\Sigma) = \int \frac{exp\left(X_j'\beta - \alpha^h p_j\right)}{1+\sum_{i=1}^{J} exp(X_i'\beta - \alpha^h p_i)} d\Phi(\bar{\theta},\Sigma), j=1,\ldots,J. \quad (11)$$

Suppose the manufacturer of each of the brands, $j=1,\ldots,J$, sets its price to maximize the profitability from its product. The equilibrium prices, p, that would prevail when X is the set of available product characteristics and $(c_1,\ldots,c_J)$ are the product unit costs can be computed by solving the following system:

$$s(j|\boldsymbol{X};\bar{\theta},\Sigma) + (p_j - c_j)\frac{\partial s(j|X;\bar{\theta},\Sigma)}{\partial p_j} = 0, j=1,\ldots,J. \quad (12)$$

The necessary conditions in equation (12) can easily be modified to allow for multi-product firms. Moreover, the solution concept can be augmented to allow for the presence of retailer intermediation.

Exhibit 1

CURRICULUM VITAE

JEAN-PIERRE H. DUBE

October 2017

ADDRESS

The University of Chicago Booth School of Business
Harper Center, office 361, 5807 South Woodlawn Avenue, Chicago, IL 60637
Tel: (773) 834 5377, Fax: (773) 702 0458
e-mail: jdube@chicagobooth.edu

ACADEMIC APPOINTMENTS

September 2008 – , Sigmund E. Edelstone Professor of Marketing, The University of Chicago Booth School of Business, Chicago, IL 60637

July 2006 – August 2008, Professor of Marketing and Neubauer Family Faculty Fellow, Graduate School of Business, University of Chicago, Chicago, IL 60637

November 2003 – July 2006, Associate Professor of Marketing, Graduate School of Business, University of Chicago, Chicago, IL 60637

April 2000 – November 2003, Assistant Professor of Marketing, Graduate School of Business, University of Chicago, Chicago, IL 60637

AFFILIATIONS

September 2017 –, Academic Trustee, Marketing Science Institute

September 2013 –, Director, Kilts Center for Marketing, The University of Chicago Booth School of Business

April 2009 –, Faculty Research Fellow, *National Bureau of Economic Research*, Industrial Organization

2008-2010, Affiliate, Yahoo! Microeconomics Research Group.

EDUCATION

1995-2000, Northwestern University, Evanston, Illinois, Doctor of Philosophy (Economics)
1995-1996, Northwestern University, Evanston, Illinois, Master of Arts (Economics)
1991-1995, University of Toronto, Toronto, Canada, H.B.Sc. (Quantitative Methods in Economics)

REFEREED PUBLICATIONS

1. "Market Structure Across Stores: an application of a random coefficients model with store level data," with Pradeep Chintagunta and Vishal Singh, *Advances in Econometrics: Econometric Models in Marketing*, ed. Philip Hans Franses and Alan Montgomery (JAI Press: 2002).

2. "Structural Applications of the Discrete Choice Model," (1st author) with Pradeep Chintagunta, Bart Bronnenberg, Ron Goettler, Amil Petrin, P.B. Seetheraman, K. Sudhir, Raphael Thomadsen and Ying Zhao, *Marketing Letters*, 13 (3), 207-220, 2002.

3. "Balancing profitability and customer welfare in a supermarket chain," with Pradeep Chintagunta and Vishal Singh, *Quantitative Marketing and Economics,* Inaugural Issue, 1 (1), 2003.

4. "Competitive Price Discrimination Strategies in a Vertical Channel with Aggregate Data," with David Besanko and Sachin Gupta, *Management Science*, 49 (9), 2003
    - **Finalist, 2004 John D.C. Little Award**

5. "Discussion of 'Bayesian Analysis of Simultaneous Demand and Supply'," *Quantitative Marketing and Economics*, 1 (3), 2003.

6. "Multiple Discreteness and Product Differentiation: Demand for Carbonated Soft Drinks," *Marketing Science*, 23 (1), 2004.
    - **Finalist, 2006 Frank M. Bass Outstanding Dissertation Award**
    - **Finalist, 2005 John D.C. Little Award**
    - **Finalist, 2014 Long-Term Impact Award**

7. "Empirical Analysis of Indirect Network Effects in the Market for Personal Digital Assistants," with Harikesh Nair and Pradeep Chintagunta, *Quantitative Marketing and Economics*, 2 (1), 23-58, 2004.
    - **Finalist, 2005 AMA TechSIG Best Article Award**

8. "Retail Pass-Through on Competing Brands," with David Besanko and Sachin Gupta, *Marketing Science*, 24 (1), 2005.

9. "Dynamic Brand Competition Across Markets: an empirical analysis," with Puneet Manchanda, *Marketing Science*, 24(1), 2005.

10. "Beyond the endogeneity bias: the effect of unmeasured brand features on household-level brand choice models," with Pradeep Chintagunta and Kim Yong Goh, *Management Science,* 51 (2), 2005.
    - formerly titled "Targeted Pricing and the estimation of consumer choice models in the presence of unmeasured product features"

11. "Product Differentiation and Mergers in the Carbonated Soft Drink Industry," *Journal of Economics and Management Strategy*, 14 (4), 2005.

12. "Recent advances in structural econometric modeling: dynamics, product positioning and entry," with K. Sudhir, Andrew Ching, Greg Crawford, Michaela Draganska, Jeremy T. Fox, Wesley Hartmann, Gunter Hitsch, V. Brian Viard, Miguel Villas-Boas, Nauffel Vilcassim, *Marketing Letters*, 16(3), 2005.

13. "Estimating an SKU-level Brand Choice Model Combining Household Panel Data and Store Data," with Pradeep Chintagunta, forthcoming at the *Journal of Marketing Research,* XLII (3), 2005.

14. "Accounting for Primary and Secondary Demand Effects with Aggregate Data," with Harikesh Nair and Pradeep Chintagunta, *Marketing Science*, 24(3), 2005.
    - formerly titled "Discrete/Continuous Demand Estimation with aggregate data: formulation and empirical application"

15. "An Empirical Model of Advertising Dynamics," with Günter Hitsch and Puneet Manchanda, *Quantitative Marketing and Economics*, 3(2), 2005.

16. "The Effect of Banner Advertising on Internet Purchasing," with Puneet Manchanda, Kim Yong Goh and Pradeep Chintagunta, *Journal of Marketing Research*, XLIII (1), February 2006.

17. "Consumer Packaged Goods in the United States: National Brands, Local Branding," with Bart Bronnenberg and Sanjay Dhar, *Journal of Marketing Research,* XLIV (1), February 2007 (lead article).
    - **Winner, 2008 Paul E. Green Award of the American Marketing Association**
    - **Finalist, 2012 William O'Dell Award of the American Marketing Association**
    - Also follow-up comment: "National Brands, Local Branding: Conclusions and Future Directions"

18. "Prominence Effect in Shanghai Apartment Prices," with Chris Hsee and Yan Zhang, *Journal of Marketing Research*, XLV (2), April 2008 (lead article).
    - formerly titled "A Behavioral Analysis of the Shanghai Real Estate Market"

19. "Category Pricing with State Dependent Utility," with Günter Hitsch, Peter Rossi and Maria Ana Vitorino, *Marketing Science,* May/June 2008.
    - **Finalist, 2008 John D.C. Little Award**

20. "Cross-Brand Pass-through in Supermarket Pricing," with Sachin Gupta, *Marketing Science*, May/June 2008 (lead article).
21. "Measuring Long Run Marketing Effects and their Implications for Long Run Marketing Decisions," with Bart Bronnenberg, Carl Mela et al., *Marketing Letters*, 19(3), 2008.

22. "Brand History, Geography, and the Persistence of Brand Shares," with Bart Bronnenberg and Sanjay Dhar, *Journal of Political Economy,* February 2009, 117(1).
    - formerly titled "Market Structure and the Geographic Distribution of Brand Shares in CPG Industries"

23. "Do Switching Costs Make Markets Less Competitive?" with Günter Hitsch and Peter Rossi, *Journal of Marketing Research*, XLVI(4), August 2009 (lead article).
    - **Finalist, 2013 William O'Dell Award of the American Marketing Association**

24. "Rejoinder to Cabral (2009) and Shin and Sudhir (2009)," with Günter Hitsch and Peter Rossi, *Journal of Marketing Research*, XLVI(4), August 2009.

25. "Tipping and Concentration in Markets with Indirect Network Effects," with Günter Hitsch and Pradeep Chintagunta, *Marketing Science,* March/April 2010.
    - **Finalist, 2010 John D.C. Little Award**

26. "State Dependence and Alternative Explanations for Consumer Inertia," with Günter Hitsch and Peter Rossi, *RAND Journal of Economics,* 41(3), Autumn 2010 (lead article).

27. "Do DVRs Influence Consumers' Brand Purchases?" with Bart Bronnenberg and Carl Mela, *Journal of Marketing Research*, 47(6), December 2010.

28. "Endogenous Sunk Costs and the Geographic Differences in the Market Structures of CPG Categories, with Bart Bronnenberg and Sanjay Dhar, *Quantitative Marketing and Economics*, 9(1), March 2011.

29. "The Evolution of Brand Preferences: Evidence from Consumer Migration, with Bart Bronnenberg and Matt Gentzkow, *American Economic Review,* 102(6), October 2012.

30. "Improving the Numerical Performance of BLP Static and Dynamic Discrete Choice Random Coefficients Demand Estimation, with Jeremy Fox and Che-Lin Su, *Econometrica,* 80(5), September 2012.
    - Computer Code to estimate the Random Coefficients Logit via GMM using the MPEC algorithm

31. "The Joint Identification of Utility and Discount Functions From Stated Choice Data: An Application to Durable Goods Adoption," with Günter Hitsch and Pranav Jindal, *Quantitative Marketing and Economics*, 12, 2014.

32. "Do Pharmacists Buy Bayer? Sophisticated Shoppers and the Brand Premium," with Bart Bronnenberg, Matt Gentzkow and Jesse Shapiro, *Quarterly Journal of Economics*, 130(4).

33. "Self-Signaling and Pro-Social Behavior: a cause marketing mobile field experiment," with Xueming Luo and Zheng Fang, *Marketing Science*, March/April, 32(6), 2017 (lead article).

34. "The Formation of Consumer Brand Preferences," with Bart Bronnenberg, Annual Review of Economics, Vol. 9, 2017

35. "Income and Wealth Effects on Private Label Demand: Evidence From the Great Recession," with Guenter Hitsch and Peter Rossi, forthcoming at Marketing Science.

36. "Competitive Price Targeting with Smartphone Coupons", with Nathan Fong, Xueming Luo, and Zheng Fang, forthcoming at Marketing Science.

WORKING PAPERS

1. "Scalable Price Targeting," with Sanjog Misra
2. "Consumer Misinformation and the Brand Premium: A Private Label Blind Taste Test," with Bart Bronnenberg and Robert Sanders
3. "Food Deserts and Food Choices Across the United States," with Hunt Alcott and Rebecca Diamond

WORKS IN PROGRESS

1. "Initial Conditions and Structural State Dependence," with Guenter Hitsch, Peter Rossi and Andrey Simonov

ACADEMIC PRESENTATIONS

"Scalable Price Targeting"

- Yale University (economics), October 2017
- Digital Economics Conference, Microsoft Research, October 2017
- Digital Economics Conference, Microsoft Research, October 2017
- NBER summmer Economics of Digitization meetings, July 2017
- HEC Montreal-CIRANO-RIIB Conference on Industrial Organization, July 2017
- Porter Conference, Northwestern University, May 2017
- Penn State (economics), February 2017
- Bridge Webinar, McGill University, Jan 2017
- Winter Marketing-Economics Summit, Jan 2017
- Digital Marketing Conference, Stanford, December 2016
- Cornell, Jonson School of Management, November 2016
- Notre Dame (Economics), November 2016

"Consumer Misinformation and the Brand Premium: A Private Label Blind Taste Test"

- Formerly Titled "Information and Demand for Branded Goods: in-store branded versus private label blind taste tests"
- McGill University, Desautels Faculty of Management, July 2017
- Data Science Academy, AC Nielsen, July 2016

- Kilts Center Marketing Insights Conference, University of Chicago, May 2016

"Competitive Price Targeting with Smartphone Coupons"

- Marketing Science Conference, Shanghai, June 2016
- Boston University, Questrom School of Business, February 2016
- UCSD, Rady School of Management, January 2016
- University of Louisville (Economics), January 2016
- Big Data Conference, NYU Stern, September 2015

"Income and Wealth Effects on Private Label Demand: Evidence From the Great Recession,"

- European Commission, June 2015

"Self-Signaling and Pro-Social Behavior: a cause marketing mobile field experiment"

- University of Maryland, Smith School of Business, September 2015
- Ohio State University (economics), September 2015
- University of Alberta, May 2015
- Columbia University, Columbia GSB, May 2015
- Winter Marketing-Economics Summit, Jan 2015
- Washington University, Olin School of Business, January 2015
- University of Pennsylvania, Wharton School of Business, January 2015
- Temple University, Fox School of Business, January 2015
- University of Chicago, Department of Economics, November 2014
- Princeton, November 2014
- University of Wisconsin (economics), November 2014
- University of Chicago, Booth School of Business, October 2014
- University of Houston, Bauer School of Business, October 2014
- Universiteit van Tilburg, September 2014
- HEC Paris, August 2014
- Colloquium on Big Data and Mobile Analytics, Temple University, November 2013

"Persistence in Market Structure and Brand Preferences for CPG"

- ICT, University of Porto, March 2014

"Do Pharmacists Buy Bayer? Sophisticated Shoppers and the Brand Premium"

- Marketing Insights at Chicago Booth, May 2014
- Winter Marketing-Economics Summit, Jan 2014
- Simon School of Business, University of Rochester, October 2013
- Fudan University, September 2013
- SITE, July 2013.
- MIT (economics), April 2013.

- The University of British Columbia, Sauder School of Busines, March 2013
- Leeds School of Business, University of Colorado at Boulder, February 2013
- University of Zurich, January 2013
- Stern School of Business, New York University, September 2012
- Cheung Kong University, June 2012
- Consumer Insights Conference, Yale University, May 2012
- Santa Clara University, January 2012
- University of Urbana-Champaign (economics), October 2011
- The Kelley School of Business, Indianan University, September 2011
- The 4th Workshop on the Economics of Advertising and Marketing (discussant Alexander Stepanov), Moscow, June 2011

"The Evolution of Brand Preferences: Evidence from Consumer Migration"
Formerly Titled "Migration and the Persistence of Consumer Brand Preferences"

- University of Western Ontario (economics), October 2010
- Boston College, September 2010
- NBER, summer I.O. meetings (discussant Fiona Scott Morton), July 2010
- Marketing Camp, UCLA, May 2010
- Consumer Insights Conference, Yale University, May 2010
- MI9 Conference, University of Tel Aviv, December 2009
- Marketing Camp, HKUST, December 2009
- The 2nd Workshop on the Economics of Advertising and Marketing (discussant Sara Biancini), Paris, June 2009

"Estimating Durable Goods Adoption Decisions From Stated Preference Data"

- UC Davis, March 2011
- The 2011 UTD Frank Bass Forms Conference, February 2011
- London Business School, January 2011
- The 2010 Choice Symposium (hosted by University of Miami), May 2010
- Marketing Dynamics Conference, NYU, August 2009

"Dynamic Decision Problems in Marketing"

- Marketing Dynamics Conference, University of Waikato, January 2009

"Improving the Numerical Performance of Discrete Choice Random Coefficients Demand Estimation,"

- NBER, winter I.O. meetings (discussant Steve Berry), February 2009
- Federal Trade Commission, November 2008
- Northwestern University (economics), October 2008
- University of Rochester, October 2008

"Tipping and Concentration in Markets with Indirect Network Effects"

Formerly Titled "Dynamic Standards Competition and Tipping: the case of 32/64 bit video game consoles"

- CRA International, July 2008
- University of Connecticut (Food Marketing), April 2008
- Yale University (economics), April 2008
- NBER, winter I.O. meetings (discussant Dan Ackerberg), February 2008
- Wharton, February 2008
- Fuqua School, Duke University, January 2008
- Universiteit van Tilberg, January 2008
- The 2007 Choice Symposium (hosted by Wharton), June 2007

"Do Switching Costs Make Markets Less Competitive?"

- Yahoo! Inc., October 2007
- The Canadian Competition Bureau, September 2007
- 2007 UBC Summer Conference on Industrial Organization, July 2007
- University of British Columbia, February 2007
- Universiteit van Tilburg, January 2007
- Inflation Research Center (discussant Alex Wolman), Chicago Fed, December 2006
- Stern School, NYU, December 2006
- HEC Montreal, December 2006
- University of Minnesota (economics), September 2006
- NBER, summer I.O. meetings (discussant Alan Sorensen), July 2006
- Erasmus University Rotterdam, June 2006
- Yale SOM, April 2006

"Category Pricing with State Dependent Utility"

Formerly titled "State Dependence in Demand and Long-Run Pricing"

- Marketing Science, Pittsburgh, June 2006
- Kellogg Marketing Camp, Northwestern University, September 2005

"Endogenous Sunk Costs and the Geographic Distribution of Brand Shares in CPG Industries"

- Strategic and Tactical Decision Making in Supermarket Retailing, SUNY Buffalo, August 2005
- Summer Institute for Competitive Strategy (discussant Avi Goldfarb), Berkeley, June 2005
- CRES I.O. conference (discussant Emek Baskar), Olin School, June 2005
- Northwestern/Chicago I.O. and Marketing Conference, June 2005
- Duke (economics), April 2005
- Harvard/MIT (economics), February 2005
- NBER, winter I.O. meetings (discussant Jonathan Levin), February 2005
- Winter Marketing Camp at Leuven, December 2004
- Johnson School, Cornell University, December 2004

"An Empirical Model of Advertising Dynamics"

- University of Arizona (economics), November 2004
- Federal Trade Commission, October 2004
- Stern School, NYU, June 2004
- London Business School, May 2004
- Haas School, UC Berkeley, April 2004
- Winter Marketing Camp at Leuven, December 2003
- Columbia GSB, Columbia University, November 2003
- Joint workshop – University of Waterloo, Wilfried Laurier University and CIGI, October 2003
- Department of Justice, October 2003

"Estimating an SKU-level Brand Choice Model Combining Household Panel Data and Store Data"

- Marketing Science, University of Maryland, June 2003.

"Targeted Pricing and the estimation of consumer choice models in the presence of unmeasured product features"

- Rotman School of Management, University of Toronto, April 2003
- Columbia GSB (economics), Columbia University, April 2003
- GSIA, Carnegie Mellon University, April 2003
- Insead, December 2002
- Winter Marketing Camp at Leuven, December 2002
- Wharton, December 2002
- University of Chicago GSB, October 2002
- INFORMS conference on pricing, Cornell, September 2002

"Balancing profitability and customer welfare: an application to zone pricing by a supermarket chain"

- Universidade Nova de Lisboa (economics), June 2002
- Anderson School, UCLA, April 2002
- Sloan School, MIT, September 2001
- Marketing Science, Wiesbaden, July 2001
- The 2001 Choice Symposium (hosted by UC Berkeley), Monterey CA, June 2001

"Competitive Price Discrimination Strategies in a Vertical Channel with Aggregate Data"

- Stanford GSB, April 2002
- INFORMS, San Antonio, November 2000
- Marketing Science, UCLA, June 2000

"Dynamic Brand Competition Across Markets: an empirical analysis"

- Marketing Science, Wiesbaden, July 2001
- MSI Conference on Competitive Response, May 2001

"Product Differentiation and Mergers in the Carbonated Soft Drink Industry"

- University of Chicago GSB (economics), January 2001
- Econometric Society Meetings, University of Washington, Seattle, August 2000
- Northwestern University (economics), October 1999

"Multiple Discreteness and Product Differentiation: Strategy and Demand for Carbonated Soft Drinks"

- Johnson School, Cornell University, April 2001
- Kellogg GSM, Northwestern University, December 1999
- Haas School, UC Berkeley, November 1999
- University of Chicago GSB, November 1999
- Simon School, University of Rochester, November 1999
- Olin School, Washington University, October 1999
- Yale SOM, October 1999
- Rotman School of Management, University of Toronto, October 1999

PAID SPEAKING ENGAGEMENTS

- McWane Ductile, July 2017
- Amazon, October 2016
- TPG Pricing Summit, May 2016
- CEO Perspectives, Chicago, May 2015
- Marketing Strategy Group, Chicago, April 2015
- Global Leadership Series, Chicago Booth, Jakarta, June 2014
- National University of Singapore, June 2014
- McDonalds, April 2014, July 2014
- Colloquium on Big Data and Mobile Analytics, November 2013
- Phoenix Products Group, November 2012
- Cheung Kong University, Trends in Marketing, June 2012
- CCIM Institute, September 2011
- ThermoFischer, September 2011
- Marketing Leadership Forum at Baxter, April 2011
- Charles River Annual Sales Meeting, January 2009
- American Bar Association, January 2009
- The Marketing Leadership Council, December 2008
- Kraft Brand Management Forum, July 2008
- NAVTEQ Global Sales and Marketing Meeting, January 2007

CONSULTING

- American Bar Association
- American College of Surgeons
- Australian Government Solicitors
- Charles River Associates
- CCIM Institute
- Finkelstein,Blankenship, Pearson-Frei & Garber

- The European Commission (design of software for merger analysis and pricing)
- Finkelstein, Blankenship, Pearson-Frei & Garber
- KamberLaw LLC
- Morris, Manning & Martin, LLP
- Pattishal McAuliffe
- Qualcomm
- Rockwell Automation
- The Roundtable Group
- Seeger Weiss, LLP
- The Scotts Company
- Winthrop & Weinstine, P.A.
- Yahoo! Research

EXECUTIVE TEACHING

- CEO Middle Market Forum
- CIO Forum
- Directors' Consortium
- Executive Leadership Program, Marketing Analytics, Qatar
- General Management Program: Marketing Analytics, Kuwait
- Marketing Analytics and Big Data, Chicago Booth
- Roundy's
- RSM McGladrey
- Strategic Marketing Management, Chicago Booth School of Business
- Tomra Systems
- UOP LLP (A Honeywell Company)
- Workiva
- Zimmer, Inc.

COURSES TAUGHT

- Marketing Strategies for High Technology and the Internet (BUS 37302)
- Pricing Strategies (BUS 37202, BUS 37801 – Executive MBA, SMM – non-degree)
- Advanced Quantitative Marketing (BUS 37904)
- Big Data and Marketing Analytics (executive)
- Strategic Marketing Analytics (executive)
- Category Management (executive)

OTHER

Associate/Area Editor:

- *Journal of Marketing Research*
- *Marketing Science*
- *Management Science*
- *Quantitative Marketing and Economics*

Member, Editorial Board

- *Production and Operations Management,* 2003-2007
- *Recherche et Applications en Marketing (RAM),* 2004-2008

Ad hoc Reviewer:

The American Economic Review, Econometrica, The Economic Journal, International Journal of the Economics of Business, International Journal of Research in Marketing, Journal of Business and Economic Statistics, Journal of Consumer Research, Journal of Industrial Economics, Journal of Law, Economics and Organizations, Journal of Political Economy, Journal of Retailing and Consumer Services, NBER, NSF, The Quarterly Journal of Economics, The Rand Journal of Economics, The Social Sciences and Humanities Research Council of Canada.

Awards

- ChicagoBooth Class of 2016 Phoenix Award (for faculty member who, in addition to his classroom responsibilities, has greatly enriched the learning experience of students through voluntary involvement in the extracurricular and community activities of the graduating class), 2016.
- 2008, Paul E. Green from the American Marketing Association
- *Faculty Teaching Excellence Award*, Evening and Weekend MBA Programs, University of Chicago GSB, 2005

Appointments and Grants

- Grant from the IGM, University of Chicago, 2014
- MSI Research Grant #4-1765, 2012
- Grant from the IGM, University of Chicago, 2011
- MSI Research Grant #4-1667, 2010
- Robert King Steel Faculty Fellow, 2009-2010, 2010-2011, 2011-2012
- Beatrice Foods, Co. Scholar, 2009-2010
- Grant from the IGM, University of Chicago, 2009
- Yahoo! Faculty Research Grant, 2008
- MSI Research Grant #4-1525, 2008
- Grant from the IGM, University of Chicago, 2007
- MSI Research Grant #4-1450, 2007
- Grant from the Polsky Center for Entrepreneurship, 2007
- ACG Research Fellow, 2006-2007
- Beatrice Foods, Co. Scholar, 2005-2006.
- MSI Research Grant # 4-1301, 2005
- True North Communications, Inc. Scholar, 2003-2004.
- Beatrice Foods, Co. Scholar, 2001-2002.

Advisory Board

- Comscore Networks
- Prepme.com
- Global Center for Big Data in Mobile Analytics

- INFORMS Society for Marketing Science (ISMS) advisory board

Member

- AEA
- INFORMS

Doctoral Dissertation Committees

- Joonhwi Joo (expected 2018)
- Robert Sanders (expected 2018)
- Xiliang Lin (expected 2018)
- Andrey Simonov (expected 2017)
- Cristian Dagnino (expected 2016)
- Naiqing Gu, 2016 (Georgia Tech)
- Indranil Goswami (expected 2016)
- Yufeng Huang (expected 2015)
- Avigail Kifer (expected 2015)
- Dan Zou (expected 2015)
- Dan Nguyen (expected 2015)
- Pranav Jindal, 2012 (Penn State)
- Navdeep Sahni, 2012 (Stanford)
- Elisabeth Honka, 2010 (UT Dallas)
- Renna Jiang, 2009 (UC Davis)
- Mitsukuni Nishida, 2009 (National University of Singapore)
- Maria Ana Vitorino, 2008 (Wharton)
- Felipe Diniz, 2008 (McKinsey)
- Hongju Liu, 2007 (University of Connecticut)
- Junhong Chu, 2006 (Business School , National University of Singapore)
- Minhua Wan, 2006 (UT Dallas)
- Harikesh Nair, 2005 (GSB, Stanford University)
- Khim Yong Goh, 2005 (Singapore National University)
- Guillermo Israilevich, 2003 (Bates White, LLC)
- Inseong Song, 2002 (Hong Kong University of Science and Technology)
- Vishal Singh, 2002 (Carnegie Mellon GSIA)

Exhibit 2

Testimony History

Ameripay, LLC. a New Jersey Limited Liability Company vs. Ameripay Payroll, Ltd. an Illinois Corporation (The United States District Court For The Northern District Of Illinois Eastern Division, Civil Action No. 04-CV-5253) (2005)

Farnam Companies, Inc. vs. Stabar Enterprises Inc. (United States District Court for the District of Arizona, Civil Action No. 2:03-CV-00503) (2005)

Liberty Mutual Insurance Company vs. BWAY Corporation, Armstrong Containers, Inc, et al., United States District Court for the Eastern District of Wisconsin, Civil Case No. 07-C-0530) (2007)

American Institute of Physics and John Wiley & Sons, Inc. vs. Schwegman Lundberg & Woessner, P.A. and John Does Nos. 1-10 (United States District Court for the District of Minnesota, No.: 12-CV-00528 (RHK-JJK)) (2013)

Philip Morris Asia Limited vs. The Commonwealth of Australia (The United Nations Commission on International Trade Law Rules of Arbitration, PCA Case No. 2012-2) (2013)

Australia — Certain Measures Concerning Trademarks and Other Plain Packaging Requirements Applicable to Tobacco Products and Packaging (World Trade Organization, Dispute DS434, DS435, DS441) (2015)

Michael Goldenberg, Annie Le, and Howard Petlack, on behalf of themselves and all others similarly situated vs. Johnson & Johnson Consumer Companies, Inc. (United States District Court for the Southern District of New York, Civil Action No. 7:13-cv-03073-NSR-LMS) (2015)

Beef Products, Inc., BPI Technology, Inc. and Freezing Machines, Inc. vs. American Broadcasting Companies, Inc., ABC News, Inc., Diane Sawyer, Jim Avila, David Kerley, Gerald Zirnstein, Carl Custer, and Kit Foshee (Circuit Court of Union County, South Dakota) (2016)

Simply Orange Orange Juice Marketing and Sales Practices Litigation (United States District Court, Western District of Missouri, Western Division, Master Case No: 4:12-md-2361-FJG) (2016)

Exhibit 3

Documents Upon Which I Have Relied

Amended Class Action Complaint, Case 1:17-cv-00614-LGS, Filed May 22, 2017.

Declaration of Melissa Morris Baccalao, Case 1:17-cv-00614-LGS, August 28, 2017.

Video Recorded Deposition of Defendants by Melissa Morris Bacallao, October 30th 2017.